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ABSTRACT

Over a three-year period every school system in Maryland received State Department of Education support in putting into practice research on effective teaching, using strategies and processes from the research on effective staff development and planned change. This paper summarizes some of the findings of an intensive study of this program, School Improvement Through Instructional Process. It discusses factors most strongly influencing successful implementation, impact, and institutionalization of four research-based innovations: (1) active teaching; (2) mastery learning; (3) student team learning; and (4) teaching variables. It also explores implications of these findings for the improvement of teaching and for effective educational change. (JD)

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IMPLEMENTING FOUR MODELS OF INSTRUCTIONAL IMPROVEMENT

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Introduction

Over a three year period every school system* in Maryland received state department support in putting into practice research on effective teaching, using strategies and processes from the research on effective staff development and planned change.

This paper summarizes some of the findings of an intensive study of this instructional improvement effort.** It discusses factors most strongly influencing successful implementation, impact, and institutionalization of four research-based innovations. It also explores implications of these findings for the improvement of teaching and for effective educational change.

Program Overview

In the three years beginning September 1981, all 24 local education agencies (LEAs) in Maryland participated in a School Improvement Through Instructional Process (SITIP) program by voluntarily implementing one or more of four research-based instructional models: Active Teaching (AT), Mastery learning (ML), Student Team Learning (STL), and Teaching Variables (TV). The Maryland State Department of Education (MSDE) encouraged the application of research on planned change, and supported local implementation by providing funds, training, and technical assistance. Evaluation was conducted in order to provide relevant information in a timely fashion so that data-based decisions could be made about the program.

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* In Maryland, each county is a school system. The 24 school systems range in size from seven to 164 schools, and include large urban LEAs (e.g., Baltimore City, Prince George's County), middle-sized suburban LEAs (e.g., Howard County) and rural districts of varying sizes (e.g., Kent and Garrett Counties).

** Annual and interim reports and related papers were developed. See bibliography.

SITIP was designed by MSDE as a multi-year program consisting of interactive activities which included cycles of planning, training, and technical assistance beginning in late 1980 (see Figure 1). State department support (funding and provision of training and technical assistance to LEAs) after the first year required commitment of matching funds from the LEAs, and, after the third year, was provided only for program expansion. At the end of the third year (June 1984) LEAs would institutionalize their model programs, or, if they were proven to be ineffective, terminate them, with each district taking responsibility for local needs, decisions, and actions.

Maryland State Department of Education staff engaged in planning, designed and conducted a variety of of training activities, and provided technical assistance to LEAs.

- In all local-site interactions, MSDE was a supporter or facilitator of instructional improvement, acting on the assumptions that the state may influence but cannot control the LEAs, and the immediate responsibility for instructional change rests with the LEAs.
- Within MSDE, particularly during the early phases of project design, interactive strategy planning was conducted to establish a clear common knowledge base of local interests, state expectations, and relevant research-based alternatives.
- MSDE sponsored a series of related training activities which were carefully designed to link relevant research and exemplary practice.* MSDE pre-contracted with LEAs so that expectations and responsibilities were clear, coached researcher-presenters to meet participants' needs, involved LEA teams as presenters to publicize successes, conducted "matching" training activities for state staff and faculty of colleges and universities involved in pre-service, and provided relevant follow-up and on-site coaching (thereby helping LEAs develop similar training activities).

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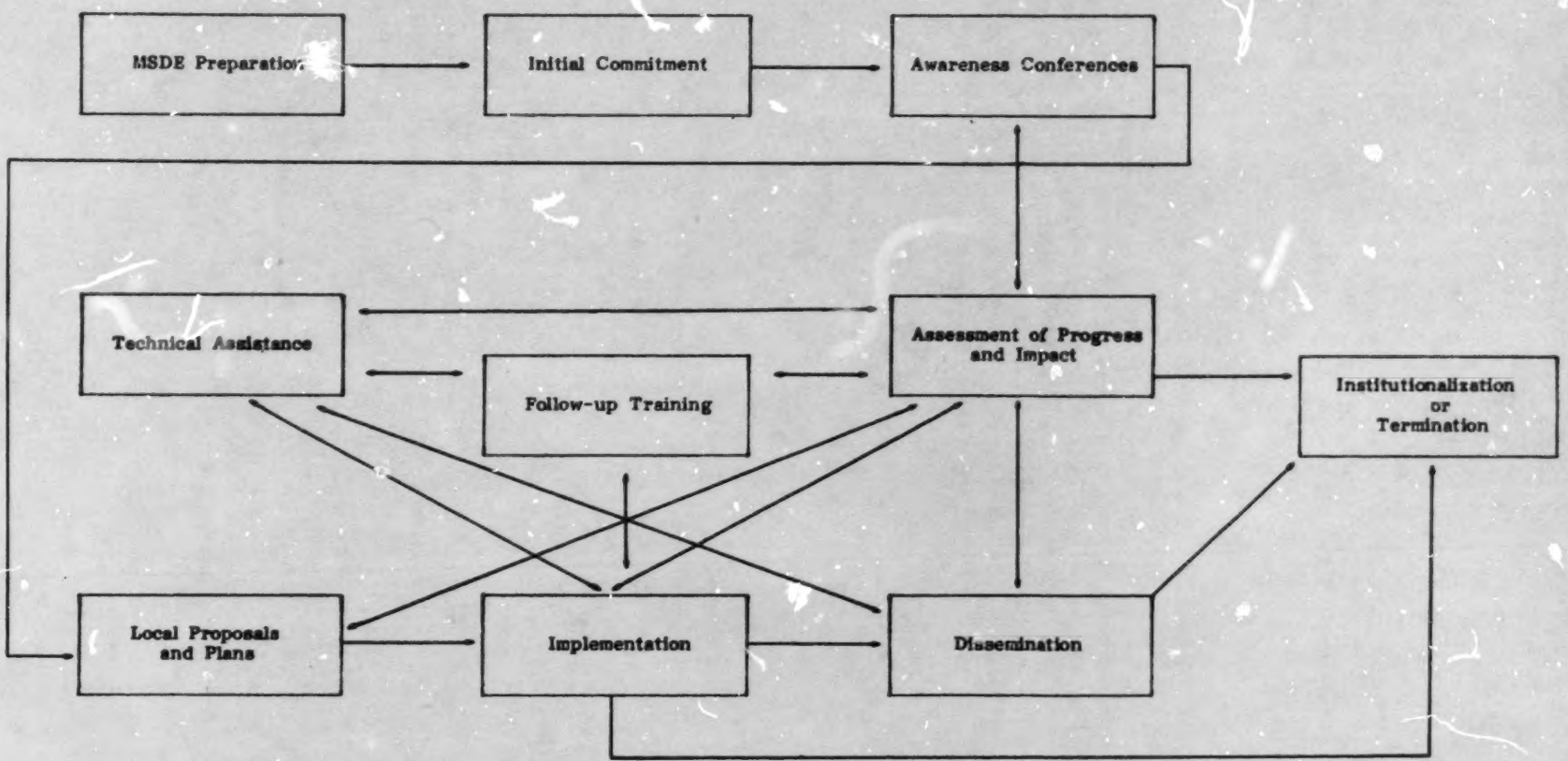
* State-sponsored conferences for SITIP participants included presentations by the developers of the four instructional models; by Barak Rosenshine, Madeline Hunter, and Jane Stallings on effective instruction; by Robert Bush and Bruce Joyce on staff development; and by Karen Seashore Louis and Harold Hodgkinson on planned change and school improvement. The MSDE technical assistants (TAs) were also strongly influenced by the work of Matthew Miles, particularly in the area of program institutionalization.

Figure 1



SITIP Design: An Interactive Model for Program Improvement

- MSDE helped local implementation by assigning a team of eight part-time technical assistants (TAs). Effective TAs had a sound knowledge of instruction, curriculum development, staff development, planned change and organizational analysis, and the models to be implemented. They were familiar with schools and school systems, particularly those to which they were assigned, and they established positive productive relationships with those systems, maintaining program integrity in the context of local constraints.

- In order of time invested overall, the following tasks were addressed by TAs: (1) visiting sites to assist and review local implementation; (2) conducting training; (3) developing program activities and planning, at the state and local levels; (4) overseeing administration and budget; (5) maintaining communication by exchanging ideas within the TA system; (6) building knowledge; (7) providing general support to local educators; (8) disseminating; (9)selecting and developing materials; and (10) evaluating.* During the three year effort, most TA time was spent in the second year (a total of about 260 days).

- From a local perspective, TAs were most useful when they were program advocates; provide quality information, training, and assistance relevant to local needs to facilitate rich fidelity of implementation; and engaged in cross-hierarchical problem-solving that helped to clarify program purpose, maintain harmony, and contribute to instructional improvement. TAs supported local leadership teams, and acknowledged successes.

The Instructional Models

Each of the instructional models is described below. These descriptions reflect the understanding of Maryland educators, based on training provided by the developers in 1980-1981.

- Active Teaching (AT) is a system of direct instruction developed by Thomas Good and Douglas Grouws at the University of Missouri. Originally designed for the teaching of mathematics, AT consists of the following components.

  1. Pre-lesson development — concepts and skills from the previous night's homework are reviewed, homework is checked and collected, and students engage in mental exercises
  2. Lesson development -- prerequisite skills and concepts are briefly reviewed, and new concepts are introduced via teacher explanation and demonstration.
  3. Controlled practice.

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* TA participation in evaluation was primarily information exchange and facilitating data collection. Time invested by RBS for evaluation was about 250 person days per year.

4. Independent, uninterrupted, individual, successful practice is provided in order to increase proficiency in the skills and concepts taught.
5. Homework -- the homework that is assigned is related to the concepts developed that day.
6. Review/maintenance -- weekly and end-of-unit reviews help to maintain the skills and concepts that have been taught.

- Mastery Learning (ML), developed by Benjamin Bloom (University of Chicago) and James Block (University of California), combines curriculum alignment and diagnostic/prescriptive instruction with a philosophy that all students can succeed. The essential components of ML follow.

  1. Developing a scope and sequence of objectives, broken down into prerequisite and component skills.
  2. Providing appropriate instruction aligned with the objectives to be mastered.
  3. Testing the students' progress in mastering the objectives through the use of a formative evaluation measure ("no fault" test).
  4. Providing students who have not achieved mastery with additional corrective work in the deficient areas specified by the formative tests, and providing students who have achieved mastery with enrichment activities to reinforce and supplement learning.
  5. Testing final mastery of the objectives with a summative evaluation measure.
  6. Recording student progress in terms of individual mastery of specific objectives. "Mastery" is usually defined as 80% of the students demonstrating success on at least 80% of the objectives in a given unit of instruction.

- Student Team Learning (STL) techniques use peer tutoring and team competition to facilitate student learning. Student Team-Achievement Divisions (STAD) and Teams-Games-Tournaments (TGT) were developed by Robert Slavin and staff at Johns Hopkins University. Jigsaw was started at the University of California at Santa Cruz. The key factors of STL are peer interaction, cooperation, and competition. STAD is basically team learning; TGT is team learning plus competition by ability level; Jigsaw is team learning of specific elements of a program, with regrouping for peer teaching across elements.

- Teaching Variables (TV) was developed by David Helms and staff at Research for Better Schools (RBS). Two variables found to be strongly related to effectiveness of instruction and student achievement were identified: "content" and "time." The "content" variable encompasses the following two factors.

  1. Assessment of prior learning.
  2. Alignment of curriculum objectives and classroom instruction to the testing instrument.

The "time" variable improvement cycle involves the following factors.

1. Measuring student engaged time (SET) via classroom observation.
2. Comparing SET and opportunity for improvement.
3. Reviewing and selecting research-based improvement strategies.
4. Implementing the selected strategies.
5. Using additional classroom observations to evaluate the effectiveness of the strategies in improving SET.

Evaluation Overview

The study covered the period December 1980 through June 1984, and addressed three areas -- institutionalization, impact, implementation, and examined both state and local activities. This paper focuses on the latter.

While Research for Better Schools (RBS) had primary responsibility for the SITIP evaluation, the design called for LEA and MSDE involvement. Guidelines were developed and MSDE staff reviewed them with LEA teams. Data were collected from MSDE staff and local educators (central office staff, school-based administrators, and teachers) representing the 29 projects at 24 LEAs. Five general methods of data collection were used: observations, interviews, questionnaires, document analyses, and measures of student attitudes and achievement. Student achievement was measured in some districts by norm-referenced tests (e.g., California Achievement Test), and in others by teacher-made criterion-referenced tests. Methodology varied. Data summaries submitted to RBS also varied. Therefore, local claims of program impact on student academic achievement could not always be empirically verified. However, other data collection was extensive, so that the combination of information from varied sources collected in varied ways contributed to a rich and accurate understanding of the program. Data were analyzed and reports were developed by RBS staff, and made available to state staff and LEA coordinators so that necessary modifications and improvements could be made to the program.

Local Implementation and Impact

From the state perspective, successful implementation of SITIP would occur if one or more of the models were used by many teachers in many schools in all LEAs. The implementation would improve instruction (thereby improving students' achievement and attitude toward learning), increase teachers' effectiveness, prove to be useful for both elementary and secondary instruction in various academic subjects, increase administrators' ability to manage planned change, and be carried out in such a way that productive working relationships were maintained across role groups. Finally, as state funds were gradually withdrawn, MSDE hoped that local SITIP projects would be institutionalized, or terminated if instruction had not been improved (with that decision based on project results discussed by all role groups).

The goals of improved knowledge, skills, and attitudes for students and teachers were expected by most LEAs. Organizational harmony and administrative skills were not overt local goals. Also, very few LEAs were initially interested in promoting widespread use or systemic institutionalization, although some districts did address those goals after the first year.

Each LEA was expected to implement a model with "fidelity," to involve cross-hierarchical teams in planning and implementation, to send representatives to state-sponsored training events, to interact constructively with TAs and other LEAs implementing a given model, and to provide information relevant to program evaluation and student assessment. Each LEA received up to $5,000 in state funds for Year 1, and up to $3,000 in each subsequent year on condition that the local system provided matching funds.

LEAs were free to choose the model(s) most likely to meet local needs, and to specify their own implementation strategies and the outcomes they expected. Also, each LEA could change plans (e.g., reduce or expand the scope

of implementation, terminate a project, or adopt another model), and, in making such changes, was encouraged to make data-based decisions (e.g., referring to students' test scores, teachers' reports, or RBS' studies). If the LEAs reduced their workscope or procrastinated, they were offered assistance to meet their own goals or given the choice of returning state funds for that year.

Implementation Strategies

During Year 1, it became apparent that staff interest was the most influential factor in selection of the model and design of the implementation strategy. While work at the school site was strongly influenced by the complexity of the model, work across the LEA (how much, how it was shared, how workloads shifted among role groups over time) was determined by the strategy. In other words, strategies requiring more work across role groups (and leading to widespread implementation) were initially selected in LEAs where administrators believed that SITIP could address a local priority. More than one model was adopted in some LEAs, sometimes with different strategies for each, and some models were added or deleted after the first year. When implementation was successful, a switch was sometimes made to a more work-intensive strategy. When implementation was less successful, a switch was sometimes made to a less work-intensive strategy or the project faded away.

The four strategies designed or selected by LEAs are summarized below.

- District-wide. All schools at a given level (usually elementary) were involved, with the selected model used for a given subject all the time by participating teachers (at least three per school in the first year, all teachers in subsequent years). This strategy required the most work from the most people, with central office staff enthusiasm and effectiveness important for success. Two projects began with this strategy, and by June 1984 a third was also implementing SITIP district-wide. All three implemented AT. The largest project involved 33 schools.

- Pilot/District. One to three schools were involved the first year, with strong central office support for school-based activities. Evidence of success led to greater administrative involvement and, in some cases, use of key teachers as turnkey trainers. This strategy was the most feasible, especially for complex models. Five projects began with this strategy, and eight were using it by June 1984. The largest number of schools involved in a pilot/district LEA was 28.

- Capacity Building. Training was conducted by the LEA team that participated in MSDE institutes. Teachers volunteered to "try" the model. There was no formal commitment to follow-up by administrators, although where this strategy was effective an administrator did "energize" the project. Five projects, all for STL, began with this strategy, of which three faded out during the second or third year. By June 1984, there were three capacity building projects (one having switched from a lighthouse strategy) with 15 schools involved in the largest project.

- Lighthouse. A single school was involved and no commitment was made by central office staff to advocate further use or initiate planning or training for other schools. Success was usually broadcast informally. This strategy put the greatest burden on school staff. There were 20 lighthouse sites initially; 14 by the end of Year 3, seven having evolved into pilot/district sites and one into capacity building. Two ending as lighthouse sites had begun with other strategies. By June 1984, the largest number of schools involved in a lighthouse LEA was three.

For widespread implementation, the lighthouse strategy was least effective, but this strategy was successful (from a small-scale perspective) when the model matched a principal's priority. Capacity building was least effective for maintaining systemic implementation, but did increase teachers' knowledge of an alternative instructional model. Overall, the pilot/district strategy was most effective, particularly for complex models in large LEAs. The district-wide model was successful with less complex models if attention was paid to building the commitment of school-based staff.

Scope, Intensity, and Fidelity of Use

Influenced by the strategy of implementation chosen and by administrators' investment of time and interest, the dimensions of scope, intensity, and fidelity indicate the nature and extent of use.

Scope. Scope of implementation by LEAs in June 1984 is presented in Table 1 and is summarized in Table 2. The 23 LEAs in the state receiving SITIP funds are listed.* Since several LEAs implemented more than one model, there were more than 23 projects. Since each LEA determined allocation of SITIP funds, multiple projects within a district were not necessarily equally funded, nor given equal attention. The strategies presented relate to those employed in Year 3. In several cases the strategies used were different from those originally planned. Expansion was influenced by local success (usually as perceived by administrators). Reduction (or termination) occurred due to minimal impact of SITIP (usually influenced by processes used and environmental turbulence). All types of schools were involved, including two vocational-technical centers, ranging from a single school in one LEA to 33 schools in another. As few as four teachers were involved in a project to as many as 700. The number of students in a project ranged from 113 to 22,594.

Overall, more than 74,000 students were involved. The 182 schools monitored by the study represented about 16% of Maryland's schools. More then 51% were elementary, usually involving students in grades 3 through 5. Both junior/middle and senior high schools were included in the 85 secondary schools. About 2,744 teachers used one or more models: additional teachers were trained within LEAs and used SITIP ideas at their own discretion. A comparison across models indicates that Active Teaching and Mastery Learning were the most widely used (impacting about 56% and 36% of SITIP students, respectively), and Student Team Learning and Teaching Variables the least widely used (impacting about 4% and 5% of SITIP students, respectively).

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* One LEA continued implementation alone after the first year, choosing not to accept state funds. That LEA is not discussed in this report.

Table 1

Scope of Implementation by LEA: All Models, June 1984

LEA	Model	Strategy	#of Schools	Type	#of Teachers	#of Students
Allegany	ML	LS	2	O	18	350
Anne Arundel	ML	LS	1	H	5	300
Baltimore City	ML	PD	28	J/M,H	606	22,594
Baltimore County	ML	PD	6	E	32	1,094
Calvert	STL	PD	3	E,J/M	13	375
	TV	PD	3	J/M	18	468+*
Caroline	AT	PD	7	E,J/M	85	2,695
Carroll	ML	PD	5	J/M	7	700
Cecil	AT	PD	25	E,J/M,H	700	13,000
Charles	STL	CB	15	E,J/M,H	116	650+*
Dorchester	STL	PD	4	E	16	425
Frederick	TV	LS	2	J/M	14	350
Garrett	AT	LS	3	J/M,H	20	1,000
Harford	AT	DW	33	E,J/M	671	18,650
Howard	ML	PD	6	E,J/M	35	1,500
Kent	TV	DW	7	E,J/M	52	1,561
Montgomery	AT	LS	1	E	8	250
	STL	LS	1	J/M	7	250
	TV	LS	2	E,J/M	14	400
Queen Anne's	STL	CB	2	J/M,H	23	800
St. Mary's	AT	CB	7	E,J/M,H	62	1,500**
Somerset	AT	LS	1	E	10	300
	TV	LS	2	E,H	12	420
Talbot	TV	LS	1	O	13	250
Washington	AT	LS		No Data		
	ML	LS		No Data		
	STL	CB		No Data		
Wicomico	AT	DW	16	E	154	3,850
Worcester	ML	LS	1	E	8	240
	STL	LS	1	E	4	113

* At pilot middle school.
** Includes some duplicates.

Model: AT=Active Teaching
ML=Mastery Learning
STL=Student Team Learning
TV=Teaching Variables

Strategy: LS=Lighthouse school
PD=Pilot district
DW=District wide
CB=Capacity building

Type: E=Elementary school
J/M=Junior high/middle school
H=High school
O=Other

Table 2

Summary of Scope of Implementation: All Models, June 1984

Model	Projects		Schools		Teachers	
	N=	%	N=*	%	N=**	%
Active Teaching	9	31	E 65 S 28 93	51	1710	62
Mastery Learning	8	27	E 10 S 37 O 2 49	27	711	26
Student Team Learning	6	20	E 15 S 11 26	14	200	7
Teaching Variables	6	20	E 6 S 10 O 1 17	9	123	5
Total	29	100	E 96 S 86 O 3 185	100	2744	100

* Three schools (two elementary and one secondary) are implementing two models.

** Eighteen teachers are implementing two models.

Schools: E = Elementary
S = Secondary
O = Other

Note: No data available for Washington County (Active Teaching and Mastery Learning).

While the relative simplicity of AT facilitated its expansion, complexity was not a deterrent: Mastery Learning was used by 27% of the SITIP schools.

Intensity. The average number of years that teachers were involved in SITIP was 1.6 for AT, 1.8 for ML, and 1.9 for STL and TV (while teachers involved from the beginning participated for three years, mean times were reduced by the large number of teachers in expansion sites). During the 1983-84 school year, teachers used STL for an average of five months, ML and TV for seven months, and AT for close to nine months. AT and ML teachers used the models for a larger percentage of their in-class time (an average of 51% and 43%, respectively) than teachers using TV (36%) and STL (19%). Consistent use facilitated instructional gain.

Fidelity. Each model required the implementation of certain components. More teachers (91%) implemented all critical components of the AT model than did the implementers of the other three models (ML — 62%, STL — 59%, TV — 46% "time", 18% "content"). With the exception of ML, which was second only to TV in complexity, the more complex the model was to implement, the less the degree of fidelity. The degree of fidelity was also related to the extent of administrator "press" for fidelity of implementation. In those LEAs where administrators encouraged and expected to see fidelity of implementation, more teachers implemented all components of the model. Such "press," plus support provided in years 2 and 3, probably facilitated the fidelity and intensity of ML (overcoming the uncertain implementation experienced in some LEAs in Year 1).

Administrative investment. The average amount of time invested by a SITIP administrator during Year 3 was 21.05 days, with means ranging from 16.45 days for AT to 26.65 days for ML. Activity areas, in order of priority allocation of time, included: (1) inservice, (2) general support, (3)

administration/communication, (4) monitoring/evaluation, and (5) dissemination/expansion. While inservice and support were top priorities for three models, top priorities for TV were administration/communication, and monitoring/evaluation. Time investments and priorities were influenced by the nature of the model and the scope of implementation. Results suggest that success (in terms of instructional gain or institutionalization) is facilitated by administrative involvement in inservice and general support.

In general, the quality of implementation varied. While there were some exemplary sites for all models, there were others where fidelity was low, or application was sporadic. Poor implementation was characterized as infrequent use of a model, pro forma application of parts of a model, lack of actual change in classroom behavior, or isolated teachers carrying out an adaptation as best they could. Excellent implementation was characterized by definable changes in classroom behavior, increased student time-on-task directly linked with aligned curriculum and quality instruction, use of the model regularly and/or for a complete unit or course, and data-based decision-making. In the sites where better implementation occurred, administrators were well informed, supportive, and expressed clear expectations of fidelity and intensity.

Roles and Responsibilities

The SITIP design encouraged participatory decision-making and involvement of all three instructional role groups in an LEA. By the end of Year 2, it was apparent that: (1) teachers involved in MSDE training activities sometimes became instructional leaders, and all teachers involved in SITIP needed time to develop materials, and support and assistance in implementation; (2) school-based administrators involved in MSDE training activities were more committed than those trained by LEAs, and all needed to support

teachers' efforts for success; and (3) central office staff, after MSDE training, determined their roles by the extent to which a model met local priorities, contributing most effort through inservice or general support, but contributing relatively little (e.g., only administration) when a lighthouse strategy was used or a model was perceived as more teacher-centered. Commitment of any role group was influenced by the extent to which individuals believed they had been given some area of choice.

In Year 3, participants, particularly the LEA teams that initiated local projects, were aware of each other's relative success and the processes and factors that inhibited or facilitated that success. They were advised by MSDE to consolidate successes, make appropriate revisions, and make data-based decisions to terminate or institutionalize as state funds were withdrawn. Particular attention was to be paid to interactive support and leadership.

Interactive support. Support among LEA participants included exchanging information and materials; providing training, coaching, and trouble-shooting; managing logistics; and recognizing successes. Support from MSDE and developers consisted primarily of training, technical assistance, networking, and trouble-shooting. As in previous years, the effects of visibility (frequency and accessibility of interactions) were apparent, with higher ratings awarded to role groups more visible to teachers. When several role groups were fairly equally visible, expertise and affective and logistical support influenced ratings. In general, developers, who interacted very little with local educators, received the lowest ratings, although STL developers, who were the most visible, were rated slightly lower than ML developers. Overall, MSDE staff received the next lowest ratings (all above average) with the expertise of ML TAs and the locally-responsive networking style of the STL TAs being well-perceived. While school-based administrators

were rated somewhat higher than central office staff overall, the range for the latter group across models was much wider than for the former. This indicated that school-based administrators played similar roles, regardless of the model, but roles played by central office staff differed by model in visibility and demonstration of expertise, and in affective and logistical support. Support by teachers was rated most highly overall, with lower ratings for AT (which was the least complex model), and TV (which made the least demands on non-observing teachers), and higher ratings for STL (which was teacher-led in many districts), and ML (which was the most complex model and made considerable demands on teachers).

In comparison to Year 2, overall ratings for each role group were slightly lower, suggesting the diminution of energy which might be expected as institutionalization occurs. Slight increases were awarded to teachers for STL and TV, and to central office staff for ML, which related to extra investments of effort which they made. Below average ratings awarded to TV central office staff were related to the fact that the role group was involved in only two of the projects.

Administrative leadership. Affective and logistical leadership behaviors are presented in Table 3, together with ratings assigned to central office staff and school-based administrators for each of the models. Overall ratings for central office staff ranged from 2.49 (press for fidelity) to 3.99 (demonstrate commitment). Overall ratings for school-based administrators ranged from 2.[illegible] (press for fidelity) to 4.23 (demonstrate commitment). For both role groups, affective behaviors were more evident than logistical behaviors, and organizational process behaviors were more evident than those related to "press." With the exceptions of central office staffs' data-based decision-making, and school administrators' press for fidelity and intensity, all

Table 3

Administrative Leadership Behaviors: All Models, 1983-84

Behaviors	Mean Ratings Assigned									
	To central office staff					To school administrators				
	AT N=94	ML N=81	STL N=43	TV N=53	all N=271	AT N=100	ML N=83	STL N=48	TV N=60	all N=291
Affective										
Demonstrate commitment	4.06	1.32	3.93	3.35	3.99	4.55	4.17	4.00	3.95	4.23
Provide support	3.45	4.06	3.74	3.11	3.61	4.12	3.98	3.82	3.80	3.97
Logistical										
Press for fidelity	2.77	2.64	2.16	2.04	2.49	3.02	2.72	2.10	2.23	2.63
Press for intensity	2.95	2.69	2.33	2.04	2.59	3.28	2.80	2.30	2.32	2.79
Provide assistance	3.39	4.16	3.86	3.00	3.61	3.80	4.09	3.83	3.62	3.85
Coordinate LEA communication	2.97	3.76	3.59	2.69	3.25	3.19	3.40	3.40	3.00	3.25
Coordinate school communication	2.81	3.61	3.37	2.68	3.11	3.57	3.55	3.40	3.30	3.48
Implement data-based decision-making	2.76	4.04	3.30	3.88	3.47	3.09	3.71	3.24	3.17	3.31

Scale ranges from 1.00 (not at all) to 5.00 (to a very large extent).

AT=active teaching; ML=mastery learning; STL=student team learning; TV=teaching variables.

ratings for leadership behaviors were lower for TV than for other models. For all models except ML, ratings were higher for school administrators than for central office staff.

In all cases, affective leadership behaviors were above average.

Logistical leadership behaviors relating to the organizational processes of provision of assistance, coordination of communication, and implementation of data-based decision-making, were above average with exceptions for the last three behaviors for central office staff in AT, and for communication behaviors for TV. Press for fidelity and intensity by school administrators were above average only for AT.

An analysis of variance showed significant differences between the four models on central office support (see Table 4). TV had the lowest, and ML had the highest mean on this index. There also were significant differences between the four implementation strategies on this index (see Table 4). The lighthouse school strategy had the lowest mean, and the pilot/district and district-wide strategies had the highest means on central office support. There were no significant differences between models or strategies on school administrator support.

"Press" indicated administrative expectations of fidelity and intensity, without which teachers could assume that it was acceptable for them to make little or no change. Low administrative press was related to low success and potential project decline.

In several LEAs, leadership was undertaken by teachers (with administrative support). In some cases, teams of key teachers conducted training and coaching, and, for TV, conducted classroom observations. In other cases, individual teachers ran the project, usually in a single school, but in one

Table 4

ANOVA Results for Central Office Support

Factor	N	$\bar{X}$	F	df	p
1. Model	228	3.30	9.19	3/224	.001
AT	77	3.12			
ML	65	3.77			
STL	37	3.46			
TV	49	2.84			
2. Strategy	228	3.30	10.14	3/224	.001
Lighthouse school	87	2.86			
Capacity building	21	3.19			
Pilot district	91	3.64			
District-wide	29	3.64			

AT = Active Teaching; ML = Mastery Learning;
STL = Student Team Learning; TV = Teaching Variables

case across the LEA (with release time to do so). The strongest leadership behaviors of teacher leaders were provision of assistance (when they had been trained at MSDE events), and support (when they believed in the model and had release time to help their colleagues). The weakest behaviors were coordination among schools (when they had insufficient release time and little influence on other schools), and press for fidelity (when they had low expertise in the model or in influencing others). In order to be effective, teacher leaders had to have real expertise in the model and strong administrative support.

Overall interactive support and leadership were good, and for most projects improvements were made over the three years. However, there were problems if reassignments resulted in leaders who lacked expertise or commitment,* if central office staff functioned only as administrators, if principals had priorities addressed by activities very different from SITIP, or if teachers were expected to do most of the work with little support. In contrast, where project teams remained stable and project management tasks were shared, where leadership behaviors were above average, and where expertise in the model helped achieve an existing priority, implementation was smoother, impact was more evident, and institutionalization more probable.

Outcomes

Institutionalization of successful projects was the desirable outcome for Year 3, and indicators were identified to determine the extent to which that was occurring. In addition, impact on students and teachers was assessed to determine instructional gain.

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* Multiple reassignments -- several key staff changed in one year, or project leadership changed each year -- resulted in loss of expertise and momentum, contributing to project decline.

Students. As indicated in Table 5, students enjoyed SITIP classes (with STL being most popular), increased their achievement (most obviously in ML), retained more of what was taught (most obviously for AT), took somewhat more responsibility for their own learning (more so for AT), and, in general, behaved a little better (more so for AT). Empirical data -- summaries of results of standardized tests and analyses of student progress comparing SITIP classes and non-SITIP classes -- supported educators' perceptions that student achievement was significantly higher when AT or ML was implemented, particularly in mathematics. No standardized test data were provided for STL or TV.

Teachers. Teachers' knowledge of effective teaching and skill in instruction improved.

Impact on teachers and students combined was defined as instructional gain. A one-way analysis of variance showed significant differences between the four models on instructional gain (see Table 6). TV differed from the other models on this index. Results showed that the mean for TV: (1) had the largest deviation from the total group mean, and (2) was the only model mean lower than the group mean.

There were also significant differences between elementary and secondary schools on instructional gain. The mean on this index was significantly lower for secondary schools than for elementary schools. (This may have been influenced by the fact that SITIP models were more often used in the latter for basic skills.)

Schools. As indicated in Table 5, educators agreed that the SITIP models worked in the classroom (with AT most strongly affirmed), and that they were worth the work they took (with strongest agreement apparent for AT).

Table 5

Instructional Impact as Perceived by Survey Respondents: All Models, 1983-84

Impact on Instruction	Models				
	AT N=124	ML N=97	STL N=54	TV N=72	Total N=347
Instructional Value					
Works in the classroom.	4.50	4.35	4.33	4.14	4.36
Is worth the work it takes.	4.29	4.05	3.96	3.82	4.14
Impact on Teachers					
Teachers enjoy it.	4.06	4.02	4.02	3.60	3.94
Teachers have increased knowledge.	4.01	4.24	3.96	3.94	4.02
Teachers have increased skills.	4.05	4.19	3.77	3.92	4.02
Impact on Students					
Students enjoy it.	3.99	4.13	4.47	3.46	4.00
Students' achievement has increased.	3.87	4.04	3.69	3.47	3.81
Students are learning/retaining more.	3.89	3.79	3.63	3.38	3.72
Students' general behavior is better.	3.70	3.55	3.60	3.58	3.62
Students are taking more responsibility for their own learning.	3.56	3.73	3.77	3.31	3.59

Mean ratings range from 1.00 (strongly disagree) to 5.00 (strongly agree).

AT = Active Teaching; ML = Mastery Learning; STL = Student Team Learning; TV = Teaching Variables

Table 6

ANOVA Results for Instructional Gain: All Models

Factor	N	X	F	df	p
1. Model	335	3.93	4.65	3/331	.003
AT	124	4.00			
ML	93	4.01			
STL	51	3.96			
TV	67	3.67			
2. School Type	320	3.92	8.85	1/318	.003
Elementary	160	4.03			
Secondary	160	3.81			

AT = Active Teaching; ML = Mastery Learning; STL = Student Team Learning; TV = Teaching Variables

School organizational outcomes were fairly good, although local "ownership" was only moderate (see Table 7). Policy outcomes (Table 8) indicated that shared management and data-based decision-making were more apparent for SITIP than for other programs. Procedural outcomes (Table 9) indicated that modification of inservice and staff assignments was occurring to a greater extent than allocation of resources and use of local funds. However, other data sources indicated that most LEAs made significant in-kind contributions.

The three sets of outcomes -- organizational, policy, and procedural -- made up the indicators for school institutionalization. An analysis of variance showed that there were no significant differences between models or strategies for school institutionalization.

A multiple regression analysis was conducted to determine which indices (instructional gain, central office support, or school administrator support, or fidelity) were the best predictors of school institutionalization (see

Table 7

Organizational Outcomes: All Models, 1983-84

Outcomes	School N=310	System N=5[illegible]
Cognitive		
Status of SITIP established.	3.76	3.83
Close to 100% of teachers asked to participate do so regularly.	3.61	3.35
Affective		
Local educators feel "ownership" of SITIP.	3.27	3.24
There is harmony between teachers and school-based administrators about SITIP.	3.87	3.78
There is harmony between school-based and central office staff about SITIP.	3.63	3.95

Scale ranges from 1.00 (not at all) to 5.00 (to a very large extent).

Table 8

Policy Outcomes: All Models, 1983-84

Policies	School		System	
	N	Mean	N	Mean
Management is shared.	76	3.96	58	3.50
Decisions are data based.	313	3.49	57	3.51

Scale ranges from 1.00 (not at all) to 5.00 (to a very large extent).

Table 9

Procedural Outcomes: All Models, 1983-84

Procedures	School		System	
	N	Mean	N	Mean
Inservice modified to support SITIP.	309	3.75	64	3.61
Staff assignments and accountabilities modified.	317	3.73	57	3.35
Resources allocated annually.	315	3.50	57	3.68
Local funds used.	70	3.07	51	3.15

Scale ranges from 1.00 (not at all) to 5.00 (to a very large extent).

Table 10).* Together, the four indices explained approximately 48% of the variance in school institutionalization, which was significant at the .05 level. The strongest predictor of school institutionalization was school administrator support, followed by instructional gain (see Table 10). School institutionalization was also strongly correlated with central office support (see Table 11).

Table 10

Multiple Regression Results for School Institutionalization

Index	B	F
School administrative support	.4928	27.320*
Instructional gain	.2365	5.614*
Central office support	.1183	1.364
Fidelity	.0732	.563

R^2 = .47884
Overall F = 17.538*
N = 73
* = less than .05

School system. Institutionalization indicators of outcomes relating to organization, policy, and procedures at the system level are presented in Tables 7, 8, and 9, with ratings given only by administrative and supervisory staff. In comparison to the school level, ratings assigned at the system level for the status of SITIP and for school and system harmony were somewhat higher. Also slightly higher at the system level were data-based decision-making, allocation of resources, and use of local funds. Of some concern were the extent of teacher participation, local ownership, modification of staff

* Seventy-three teachers responded to all five indices and were included in the calculation.

assignments, and use of local funds (although the ratings on the latter were somewhat misleading given the considerable investments of in-kind contributions). It should be noted that system-level outcomes were less important in LEAs focusing on a lighthouse school approach. However, from an overall cost-effective perspective, higher ratings were desirable since they indicated greater likelihood of district-wide institutionalization.

An analysis of variance showed significant differences between the four implementation strategies on system institutionalization (see Table 12). Results showed that the mean for the lighthouse school strategy: (1) had the largest deviation from the total group mean, and (2) was the only strategy mean lower than the group mean.

There were no significant differences between the models on system institutionalization.

Correlation among the five indices showed strong direct relationships (r - .50) between system institutionalization and two indices -- central office support and school institutionalization (see Table 11).

Table 11

Intercorrelation Among the Five Indices: All Models

Index	1	2	3	4	5
1. Instructional Gain		.44	.34	.23	.26
2. System Institutionalization			.67	.80	.42
3. School Institutionalization				.51	.68
4. Central Office Support					.45
5. School Administrator Support					

Note: The number of cases upon which the correlations were calculated varied.

Table 12

ANOVA Results for System Institutionalization

Factor	N	X	F	df	p
Strategy	48	3.60	10.76	3/44	.001
Lighthouse school	12	2.51			
Capacity building	4	3.73			
Pilot/district	24	4.01			
District-wide	8	3.95			

Summary and Conclusions

Rather than repeat preceding discussions, this section attempts to answer questions most often posed by researchers, policy makers, and practitioners who are interested in large scale instructional improvement. Most such questions are contained in the overall question:

- If the "bottom line" is instructional gain, and if that is accomplished by bringing about long-lasting, worthwhile changes in teachers' behavior, what are the processes and content to be applied by large systems such as state departments or large school districts?

Since SITIP was informed by the research on classroom and school effectiveness and planned change, the authors of this report believe that the processes, findings, and conclusions are generalizable, and may well prove to be useful to those involved in similar projects elsewhere.

<u>If an instructional improvement program is initiated, what indices should be monitored to gauge the "health" of the program and the probability of eventual institutionalization?*</u>

- Indicators of program fidelity and intensity include:
  1. The extent to which participating educators carry out critical components of the program regularly and/or continuously.
- Indicators of instructional gain include:
  1. Impact on teachers: increase in knowledge and skills, positive attitude to the program.

2. Impact on students: increase in achievement, learning, and retention; improvement in general behavior and the extent to which they take responsibility for their own learning; a positive attitude toward the program.

- Indicators of administrative support include:**

  1. Affective behaviors that...

     (a) demonstrate commitment and belief in the program's value

     (b) provide support by demonstrating interest and recognizing teacher success.

  2. Such logistical behaviors as...

     (a) a positive "press" for fidelity, monitoring implementation, and expecting a given level of use of the program

     (b) a positive "press" for intensity, monitoring implementation, and helping to ensure that at least three teachers in each participating school use the program regularly

     (c) providing assistance by coordinating, training, responding to requests, and providing resources

     (d) coordinating communication across hierarchical levels for program review and improvement

     (e) implementing data-based decision-making.

- Indicators of institutionalization include:

  1. Organizational outcomes

     (a) cognitive: the status of the program is commonly understood, clearly stated, and close to 100% of teachers asked to participate do so regularly

     (b) affective: local educators feel "ownership" of the program; there is harmony between teachers and school-based administrators about the program; and there is harmony between school-based staff and central office staff about the program.

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* Tasks that are specifically administrative (e.g., budget) take minimal time, and are subsumed under 2c of administrative support.

** The authors acknowledge the influence of Matt Miles in determining these indicators. See: Miles, M.B. Unraveling the mystery of institutionalization. Educational Leadership. November 1983, 14-19.

2. Policy outcomes

   (a) management (leadership, advocacy, decision-making) is shared, not reliant on a single administrator

   (b) effectiveness is assessed and data are used in decision-making.

3. Procedural outcomes

   (a) inservice is modified to support the program

   (b) staff are assigned and accountabilities are modified

   (c) resources (time, materials) are allocated annually

   (d) local funds are used.

- The strongest predictors of school institutionalization are support from school-based administrators and instructional gain. This indicates that the program selected has to be one that really makes a difference in the classroom, and is sufficiently linked to the principal's priorities to influence administrative investment in affective and logistical leadership behaviors.

- District-wide institutionalization is strongly correlated with central office support and school-level institutionalization. The lighthouse school implementation strategy does not facilitate district-wide institutionalization. However, central office support is more evident when pilot/district or district-wide approaches are used, and in programs with high probability of instructional gain.

- If the program selected has proven its value elsewhere, but results in little or no instructional gain at a new site, the fidelity and intensity of use should be assessed. If both are high but apparent for only a few isolated teachers, administrative support needs to be improved and organizational, policy, and procedural outcomes assessed and modified if institutionalization is to occur.

<u>If the innovation is directly related to a local priority, how can an LEA design implementation to ensure that program benefits are greater than investments (of staff, time, and funds)</u>?

- A cross-hierarchical team should be formed that takes responsibility for planning, making decisions, and modifying activities by using information about the relative effectiveness of the program. This team (plus other representatives of role groups) should have a thorough understanding of the innovation so that plans are realistic and policy and practice are interactive.

- A pilot/district or district-wide strategy can be used. In both cases, the goal is for all program eligible teachers to be implementing the model regularly by the end of the third year, and a process of incremental involvement is used. The pilot/district strategy begins by focusing on a very few schools, and expands by school, beginning in each school with the principal's support and an active team of volunteer teachers. The district-wide strategy begins by focusing on teachers (from all schools) with responsibility for a given subject area and grade level(s), and expands by grade level (and sometimes also by subject area). In both cases, awareness training should be conducted for all administrative and supervisory staff before teachers are trained. "First wave" participants should be volunteers to the extent feasible.

- Attention should be paid to the indicators of institutionalization, particularly those relating to organizational outcomes and administrative support.

- Participating teachers should be given release time, and school teams should have common planning time in their first year of implementation, with more time available if curriculum materials are to be developed.

- Classroom instruction should not begin until teachers are prepared to teach a complete unit or course. Stops and starts, sporadic implementation, and low fidelity should be discouraged by team leaders providing relevant coaching or support so that participating teachers can experience success.

- Assessment of implementation processes and instructional gain should be on-going to inform decisions -- replicating successes, and dealing with problems as soon as they are identified.

How can training activities be most useful in improving classroom instruction?

- The overall design for training should include various kinds of activities for various audiences. In general, trainers should recognize that the more intense the intended outcome, the greater the frequency of trainer/trainee interaction, and the smaller the ratio of trainers to trainees. Also, the less intense the outcome (e.g., awareness), the less investment is likely from participants.*

- While participants enjoy the less intense kinds of training activities, they value and are more likely to be influenced by the more intense activities (especially when content is highly relevant).

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* See Joyce, B.R., & Showers, B. Power in staff development through research on training. Alexandria, Va.: ASCD, 1984. Components of the model include: rationale and theory building (for awareness), demonstration and modeling (for conceptualization), practice and feedback (for skill development), on-site coaching (for application or horizontal transfer), and integrated learning (for executive control or vertical transfer).

As the project progresses, training activities should increase in intensity, and when participants have "executive control" of the model/innovation, training should stop.

- Training should be directly related to participants' need to know, building on existing knowledge, and addressing current tasks and interests. Pre-contracting clarifies mutual expectations of participants' responsibilities for action following training.

- Training should be designed to be transferred, using a trainer of trainers approach, or expecting district and school teams to follow through on the more intense activities.

- Team training, with common activities for everyone as well as activities for specific roles and for groups with varying levels of expertise, should address both program content and implementation processes.

- Training should be conducted by outside "experts," such as program developers, and by state and local instructional leaders, with each event including trainers from several role groups. ("Outsiders" should be carefully coached about trainees' interests.)

- Teachers who conduct training usually are most successful when they form trainer teams of two or three people. Individual teacher-trainers need strong support from administrative staff.

- The final components of training (on-site coaching and integrated learning) can be conducted by three-person teacher teams in each school which are supported by a district-wide network.

- While the integrity of the knowledge base (program fidelity and completeness) should be maintained, trainers should be flexible in the delivery of training, modifying methods to meet participants' needs (e.g., using different approaches for different schools).

<u>If the innovation(s) match local priorities, and the research on planned change is applied to facilitate implementation, what is the likelihood of local institutionalization of an externally-initiated program</u>?

- The likelihood of some projects being institutionalized is increased by the use of the research on planned change, but schools are impacted by the constant changes of society. Schools and school systems cannot accurately predict or control the social pressures or environmental turbulence that can change priorities or undermine programs. However, they can select innovations most likely to address the basic business of schooling -- effective instruction -- in which they naturally invest their own efforts and for which external support may be a welcome temporary addition.

- In lighthouse schools, institutionalization is probable if the principal's priorities are addressed, there are no conflicting innovations, and at least three teachers advocate and implement the innovation regularly.

- Institutionalization is unlikely if funds are used primarily for training (a capacity-building approach) with voluntary application by trainees, unless school teams pre-contract and those teams receive follow-up assistance in the context of an administrative "press" for implementation.

- Institutionalization is likely where the indicators (described earlier) are attended to from the beginning of the program, where materials development is essentially completed by the middle of the second year, and where total local ownership is expected by the end of the third year.

<u>If instructional gain is the intended outcome, what kind of innovation is best?</u>

- Instructional gain is defined as (1) increase in teachers' knowledge and skill in effective instruction and a positive attitude toward the program, and (2) increased student achievement and acceptance of responsibility for their own learning, and a positive attitude towards the program.

- Since instructional gain is such a comprehensive construct, it is unlikely to be achieved without careful implementation and planning, a reasonable scope and intensity of use, and application of an innovation designed to achieve such an outcome. The four models used in SITIP were so designed, and careful attention was paid to implementation processes.

- Assuming appropriate implementation and good fidelity, greatest instructional gain is likely if Active Teaching or Mastery Learning are used, with best results in elementary mathematics, or for structured academic subjects in secondary schools. Student Team Learning results in somewhat less instructional gain since educators tend to use it sporadically. Least gain is likely for Teaching Variables since educators tend to use it for assessment rather than from improvement.

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